

[Japanese \(PDF\)](#)[File Wrapper Information](#)

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FULL CONTENTS CLAIM + DETAILED DESCRIPTION**TECHNICAL FIELD EFFECT OF THE INVENTION**

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Notes:

1. Untranslatable words are replaced with asterisks (***)�.
2. Texts in the figures are not translated and shown as it is.

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Dictionary: Last updated 03/23/2009 / Priority: 1. Chemistry / 2. Mechanical engineering / 3. Technical term

FULL CONTENTS**[Claim(s)]**

[Claim 1][I] The crystalline polyolefin resin (A) 10 - 50 weight sections, the [II] olefin system rubber (B) 20 - 60 weight-section [III] Styrene or a polymeric block (c-1) of the derivative, They are an isoprene polymer block, a butadiene polymer block, or an isoprene butadiene copolymer block, The ** styrene system block copolymer (C) 5 from a polymeric block or a copolymer block (c-2) to which hydrogenation of the not less than 97% of the whole unsaturated bond was carried out - 25 weight sections, And a thermoplastic elastomer composition which the total quantity of [IV] softener (D) 5-40 weight-section [component (A), (B), (C), and (D) consists of 100 weight-section], and is characterized by a gel content being not less than 97%.

[Claim 2]The styrene system block copolymer (C) 5 - 25 weight sections characterized by comprising the following, And a mixture [component (A) which consists of the [IV] softener (D) 5 - 40 weight sections, The thermoplastic elastomer composition according to claim 1 which the total quantity of (B), (C), and (D) is obtained by heat-treating 100 weight-section] dynamically under existence of organic peroxide, and is characterized by a gel content being not less than 97%.

[I] The crystalline polyolefin resin (A) 10 - 50 weight sections, the [II] olefin system rubber (B) 20 - 60 weight-section [III]. Styrene or a

polymeric block of the derivative (c-1)

A polymeric block or a copolymer block (c-2) to which it is an isoprene polymer block, a butadiene polymer block, or an isoprene butadiene copolymer block, and hydrogenation of the not less than 97% of the whole unsaturated bond was carried out.

[Claim 3]The thermoplastic elastomer composition according to claim 1 or 2, wherein said crystalline polyolefin resin (A) contains polypropylene resin 50weight % or more.

[Claim 4]The thermoplastic elastomer composition according to any one of claims 1 to 3, wherein said olefin system rubber (B) is ethylene propylene and non-conjugated diene copolymer rubber.

[Claim 5]Peroxide un-contracting type hydrocarbon system rubber (E) of a bridge Crystalline polyolefin resin (A), The thermoplastic elastomer composition according to any one of claims 1 to 4 characterized by carrying out 1-20 weight-section content to total quantity 100 weight section of olefin system rubber (B), a styrene system block copolymer (C), a softener (D), and peroxide un-contracting type hydrocarbon system rubber (E) of a bridge.

[Claim 6]The thermoplastic elastomer composition according to claim 5, wherein peroxide un-contracting type hydrocarbon system rubber (E) of a bridge is isobutylene-isoprene rubber or polyisobutylene.

[Claim 7]The amount of said organic peroxide used Crystalline polyolefin resin (A), olefin system rubber (B), The thermoplastic elastomer composition according to any one of claims 2 to 6 characterized by being 0.6 - 2.0 weight section to total quantity 100 weight section of a styrene system block copolymer (C), a softener (D), and peroxide un-contracting type hydrocarbon system rubber (E) of a bridge.

[Claim 8]A thermoplastic elastomer composition comprising:
One thermoplastic elastomer composition 100 weight section of the
Claims 1-7.
Five to crystalline-polyolefin-resin 200 weight section.

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the thermoplastic-elastomer-olefin constituent which can provide the Plastic solid which was excellent in moldability and was moreover excellent in rubber elasticity in more detail about a thermoplastic elastomer composition.

[0002]

[Background of the Invention]Since thermoplastic elastomer olefin is lightweight and easy to recycle, it is widely used for autoparts, industrial machine parts, the electrical and electric equipment and electronic parts, building materials, etc. especially as a substitute of vulcanized rubber as an energy saving and saving-resources type elastomer.

[0003]However, conventional thermoplastic elastomer olefin has the fault that rubber elasticity is inferior compared with vulcanized rubber, and the improvement was called for strongly. As thermoplastic elastomer olefin which improved rubber elasticity, the what is called full bridge formation type thermoplastic elastomer olefin (for example, elastomer proposed in JP,S55-18448,B) which made the degree of cross linking high is proposed from before.

[0004]However, although such full bridge formation type thermoplastic elastomer olefin is excellent in rubber elasticity compared with partial bridge formation type thermoplastic elastomer olefin, since there was a problem in moldability or the appearance of the Plastic solid, the use used was restricted.

[0005][use / this invention persons inquire wholeheartedly that the above problems should be solved, and / at a specific rate / for the raw material of thermoplastic elastomer / a specific styrene system block copolymer] It finds out that the thermoplastic elastomer composition which can provide the Plastic solid which was excellent in moldability and was moreover excellent in rubber elasticity and appearance is obtained, and came to complete this invention.

[0006]

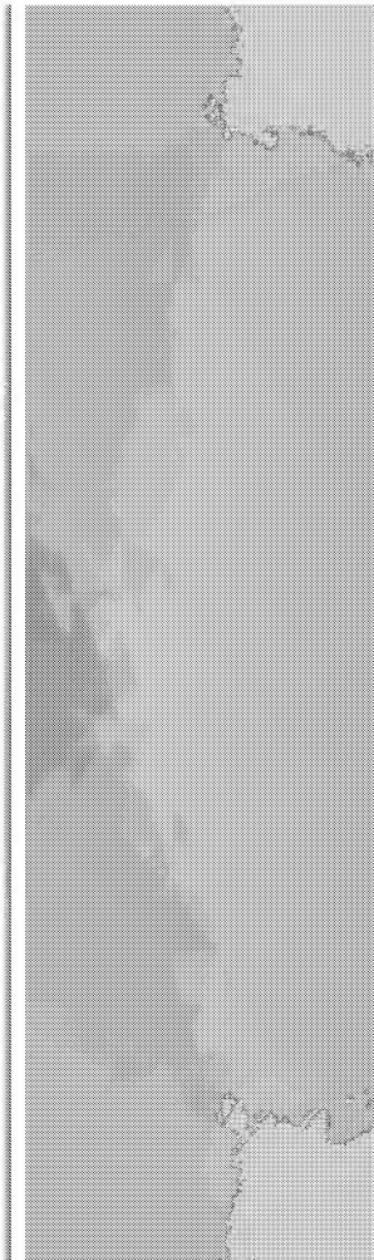
[Objects of the Invention]An object of this invention is to provide the thermoplastic elastomer composition which can supply the Plastic solid which is going to solve the problem accompanying the above conventional technologies, was excellent in moldability, and was moreover excellent in rubber elasticity and appearance.

[0007]

[Summary of Invention][the thermoplastic elastomer composition concerning this invention] [I] The crystalline polyolefin resin (A) 10 - 50 weight sections, the [II] olefin system rubber (B) 20 - 60 weight-section [III] Styrene or the polymeric block (c-1) of the derivative, They are an isoprene polymer block, a butadiene polymer block, or an isoprene butadiene copolymer block, The styrene system block copolymer (C) 5 in which not less than 97% of the whole unsaturated bond consists of the polymeric block or copolymer block (c-2) by which hydrogenation was carried out - 25 weight sections, And the total quantity of [IV] softener (D) 5-40 weight-section [component (A), (B), (C), and (D) consists of 100 weight-section], and it is characterized by a gel content being not less than 97%.

[0008]As the above-mentioned thermoplastic elastomer composition, the following constituent is preferred.

[I] The crystalline polyolefin resin (A) 10 - 50 weight sections, the [II] olefin system rubber (B) 20 - 60 weight-section [III] Styrene or the polymeric block (c-1) of the derivative, They are an isoprene polymer block, a butadiene polymer block, or an isoprene butadiene copolymer block, The styrene system block copolymer (C) 5 in which not less than 97% of the whole unsaturated bond consists of the polymeric block or copolymer block (c-2) by which hydrogenation was carried out - 25 weight sections, And the thermoplastic elastomer composition whose gel content the total quantity of mixture [component (A), (B), (C), and (D)



which consists of the [I] softener (D) 5 - 40 weight sections is obtained by heat-treating 100 weight-section] dynamically under existence of organic peroxide, and is not less than 97%.

[0009]The above-mentioned thermoplastic elastomer composition, [the peroxide un-construting type hydrocarbon system rubber (E) of a bridge] 1-20 weight-section content may be carried out to total quantity 100 weight section of crystalline polyolefin resin (A), olefin system rubber (B), a styrene system block copolymer (C), a softener (D), and the peroxide un-construting type hydrocarbon system rubber (E) of a bridge.

[0010]As for the thermoplastic elastomer composition concerning this invention, the 5-200 weight-section blend of the crystalline polyolefin resin, such as the above-mentioned crystalline polyolefin resin (A), may be carried out at the thermoplastic elastomer composition 100 above weight sections.

[0011]

[Detailed Description of the Invention]Hereafter, the thermoplastic elastomer composition concerning this invention is explained concretely. The thermoplastic elastomer composition concerning this invention consists of peroxide un-construting type hydrocarbon system rubber (E) of a bridge crystalline polyolefin resin (A), olefin system rubber (B), a styrene system block copolymer (C), a softener (D), and if needed, and has a specific gel content.

[0012]As crystalline polyolefin resin (A) used by crystalline-polyolefin-resin (A) this invention, they are the numbers 2-20alpha of carbon atoms.

- The homopolymer or copolymer of olefin is mentioned.

[0013]The following (**) polymers are mentioned as a concrete example of the above-mentioned crystalline polyolefin resin (A).

(1) Ethylene homopolymer (any of a low voltage method and a high pressure process may be sufficient as a process)

(2) Ethylene and other alpha not more than 10 mol % - Olefin or vinyl acetate, A copolymer with vinyl monomers, such as ethyl acrylate. (3) A propylene homopolymer. (4) Propylene and other alpha- not more than 10 mol %. Random copolymer (5) propylene with olefin, and other alpha not more than 30 mol % - Block copolymer (6)1-butene homopolymer (7) 1-butene with olefin, and other alpha not more than 10 mol % - Random copolymer (8)4-methyl-1- with olefin. Pentene homopolymer (9)4-methyl-1- Pentene and other alpha not more than 20 mol % - alpha of the random copolymer above with olefin - [as olefin] Specifically, they are ethylene, propylene, 1-butene, and the 4-methyl- 1. - Pentene, 1-hexene, 1-octene, etc. are mentioned.

[0014]Also in the above-mentioned crystalline polyolefin resin, they are a propylene homopolymer, propylene, and other alpha not more than 10 mol %. - A random copolymer with olefin, propylene, and other alpha not more than 30 mol % - Especially a block copolymer with olefin is preferred.

[0015]The above crystalline polyolefin resin (A) is independent, or can be combined and used. the crystalline polyolefin resin (A) used by this invention -- a melt flow rate [MFR;ASTM D 1238, 230 **, and 2.16 kg

of load] -- 0.1 - 100g/-- there are 10 minutes within the limits of 0.3-60g/10 minutes preferably.

[0016]Crystalline polyolefin resin (A) usually has preferably 5 to 100% of the crystallinity for which it asked by the X-rays method in 20 to 80% of range. In this invention, [crystalline polyolefin resin (A)] The above-mentioned crystalline polyolefin resin (A), olefin system rubber (B), It is preferably used at a rate of 12 - 42 weight section still more preferably ten to 45 weight section ten to 50 weight section to total quantity 100 weight section of a styrene system block copolymer (C), a softener (D), and the peroxide un-constructing type hydrocarbon system rubber (E) of a bridge. However, since the peroxide un-constructing type hydrocarbon system rubber (E) of a bridge is an optional component, it may serve as zero weight section.

[0017]The alpha olefin content with 2-20 carbon atoms of the olefin system rubber (B) used by olefin system rubber (B) this invention is a formless random elastic copolymer beyond 50 mol %.

[0018][as such a formless random copolymer] Two or more sorts of alpha - The amorphous alpha- olefine copolymer, two or more sorts of alpha which consist of olefin - alpha which consists of olefin and nonconjugated diene - There are olefin, a non-conjugated diene copolymer, etc., and, specifically, the following rubber is mentioned.

- (1) Ethylene and alpha- olefine copolymer rubber [ethylene / alpha-olefin (molar ratio) = about 90/10 - 50/50]
- (2) Ethylene, alpha- olefin and non-conjugated diene copolymer rubber [ethylene / alpha-olefin (molar ratio) = about 90/10 - 50/50]
- (3) Propylene and alpha- olefine copolymer rubber [propylene / alpha-olefin (molar ratio) = about 90/10 - 50/50]
- (4) Butene and alpha- olefine copolymer rubber [butene / alpha- olefin (molar ratio) = about 90/10 - 50/50]

Above-mentioned alpha- alpha which specifically constitutes as olefin the crystalline polyolefin resin (A) mentioned above - The same alpha as the concrete example of olefin - Olefin is mentioned.

[0019]Specifically as the above-mentioned nonconjugated diene, dicyclopentadiene, 1,4-hexadiene, cyclo-octadiene, methylene norbornene, ethyldene norbornene, etc. are mentioned.

[0020]The ethylene andalpha of the above (2) with which such nonconjugated diene has copolymerized - As for the iodine number of olefin and non-conjugated diene copolymer rubber, 25 or less are preferred. The above (1) The Mooney viscosity [ML₁₊₄ (100 **)] of the

copolymer rubber of - (4) is 10-250, and especially 40-150 are preferred.

[0021]The above (1) They are the ethylene andalpha of (2) also in the copolymer rubber of - (4). - Olefin and non-conjugated diene copolymer rubber are preferred. As for the olefin system rubber (B) used by this invention, existing, where a bridge is constructed highly is preferred.

[0022]In this invention, [olefin system rubber (B)] As opposed to total quantity 100 weight section of the above-mentioned crystalline polyolefin resin (A), olefin system rubber (B), a styrene system block copolymer (C), a softener (D), and the peroxide un-constructing type

hydrocarbon system rubber (E) of a bridge, It is preferably used at a rate of 30 to 55 weight section still more preferably 25 to 60 weight section 20 to 60 weight section.

[0023]The styrene system block copolymer (C) used by styrene system block copolymer (C) this invention is a block copolymer by which hydrogenation was carried out.

The polymeric block (c-1) of styrene or its derivative, and an isoprene polymer, the unsaturated bond whole [in / it consists of a block (c-2) which consists of a butadiene polymer or an isoprene butadiene copolymer, and / a block (c-2)] -- hydrogenation of not less than 98% of the unsaturated bond is carried out preferably not less than 97%.

[0024]The polymer component which constitutes the above-mentioned block (a) is styrene or its derivative. Specifically as a derivative of styrene, it is alpha. - Methylstyrene, 1-vinylnaphthalene, 2-vinylnaphthalene, 3-methylstyrene, 4-propylstyrene, 4-cyclohexyl styrene, 4-dodecylstyrene, 2-ethyl- 4 - Benzylstyrene, 4-(phenylbutyl) styrene, etc. are mentioned. As a polymer component which constitutes a block (a), they are styrene and alpha. - Methylstyrene is preferred.

[0025]The rate of the polymeric block (c-1) of styrene in this styrene system block copolymer (C) or its derivative is 15 to 40weight % of a range still more preferably ten to 50weight % preferably.

[0026]20g/10 minutes or less of melt flow rates (MFR;ASTM D 1238, 230 ***, 2.16-kg load) of the styrene system block copolymer (C) used by this invention are 10g/10 minutes or less still more preferably preferably.

[0027]As a block form of this styrene system block copolymer (C), although the form of a block (c-1)-block (c-2)-block (c-1) is the most preferred, it is not restricted to this.

[0028]Such a styrene system block copolymer (C) can be manufactured by the following methods, for example. First, the styrene system block copolymer which is not *****(ed) is prepared by methods, such as following (1) - (3).

(1) The method of carrying out successive polymerization of styrene or its derivative, isoprene, or the isoprene butadiene mixture by using an alkyllithium compound as an initiator.

(2) Styrene or its derivative, the method of ranking second, polymerizing isoprene or an isoprene butadiene mixture, and carrying out coupling of this by a coupling agent.

(3) Use a dilithium compound as an initiator and they are isoprene or an isoprene butadiene mixture, and the method of ranking second to which and carrying out successive polymerization of styrene or its derivative.

[0029]The details of the manufacturing method of the above-mentioned block copolymer are indicated, for example to JP,H2-300250,A. Next, if catalytic hydrotreating is performed to the styrene system block copolymer obtained by the above methods, the block copolymer (C) by which hydrogenation was carried out will be obtained. The block ****(ed) is an isoprene polymer block, a butadiene polymer block, or an isoprene butadiene copolymer block (c-2).

[0030]In this invention, [a styrene system block copolymer (C)] As

opposed to total quantity 100 weight section of the above-mentioned crystalline polyolefin resin (A), olefin system rubber (B), a styrene system block copolymer (C), a softener (D), and the peroxide un-constructing type hydrocarbon system rubber (E) of a bridge, It is preferably used at a rate of ten to 20 weight section still more preferably ten to 25 weight section five to 25 weight section.

[0031]As a softener (D) used by softener (D) this invention, the softener usually used for rubber is suitable.

[0032]Specifically Process oil, a lubricating oil, paraffin, liquid paraffin, Coal tar, such as petroleum system substance; coal tar, such as petroleum asphalt and vaseline, and a coal tar pitch; Castor oil, Fatty oil, such as flaxseed oil, rapeseed oil, soybean oil, and coconut oil; Tall oil, beeswax, Lows, such as a carnauba wax and lanolin; Recinoleic acid, palmitic acid, Fatty acid or its metal salt, such as stearic acid; Petroleum resin, cumarone indene resin, synthetic macromolecule [, such as atactic polypropylene,]; -- ester system plasticizer [, such as dioctyl phthalate dioctyl adipate, and dioctyl sebacate,]; -- in addition to this, microcrystallin wax, liquid polybutadiene, its denaturation thing or a water garnish, liquefied Thiokol, etc. are mentioned.

[0033]Such a softener (D) Crystalline polyolefin resin (A), olefin system rubber (B), It is preferably used at a rate of 10 - 35 weight section still more preferably ten to 40 weight section five to 40 weight section to total quantity 100 weight section of a styrene system block copolymer (C), a softener (D), and the peroxide un-constructing type hydrocarbon system rubber (E) of a bridge.

[0034]If a softener (D) is used at an above rate, the thermoplastic elastomer composition obtained will be excellent in the flowability at the time of shaping, and will not reduce the mechanical properties of the Plastic solid.

[0035][rubber / peroxide un-constructing type hydrocarbon system / which is used if needed by peroxide un-constructing type hydrocarbon system rubber (E) this invention of a bridge / of a bridge / (E)] Even if it heat-treats dynamically at the temperature more than the decomposition temperature under existence of peroxide (organic peroxide), a bridge is not constructed but the rubber-like substance of a hydrocarbon system in which flowability does not fall is said.

[0036]Specifically, isobutylene-isoprene rubber, polyisobutylene rubber, and propylene are mentioned for the propylene ethylenic copolymer rubber beyond 50 mol %, propylene, 1-butene copolymer rubber, etc.

[0037]Also in this, isobutylene-isoprene rubber or polyisobutylene rubber is used especially preferably. [the above-mentioned peroxide un-constructing type hydrocarbon system rubber (E) of a bridge] Total quantity 100 weight section of crystalline polyolefin resin (A), olefin system rubber (B), a styrene system block copolymer (C), a softener (D), and the peroxide un-constructing type hydrocarbon system rubber (E) of a bridge is received if needed, It is preferably used at a rate of ten to 20 weight section still more preferably five to 20 weight section one to 20 weight section.

[0038]If the peroxide un-constructing type hydrocarbon system rubber

(E) of a bridge is used at an above rate, the thermoplastic elastomer composition which can provide the Plastic solid which was excellent in moldability and was moreover excellent in appearance will be obtained. [0039] In other component this inventions, additives, such as a heat-resistant stabilizer, an antistatic agent, weathering stabilizer, an age resistor, a bulking agent, a colorant, and lubricant, can be blended into a thermoplastic elastomer composition in the range which does not spoil the purpose of this invention if needed.

[0040] [the thermoplastic elastomer composition concerning thermoplastic elastomer composition this invention] It consists of peroxide un-constructing type hydrocarbon system rubber (E) of a bridge, and various additives the above crystalline polyolefin resin (A), olefin system rubber (B), a styrene system block copolymer (C), a softener (D), and if needed, and a gel content is 97 to 103% preferably not less than 97%. The gel content in this invention exceeds 100%, and can show 110%.

[0041] The thermoplastic elastomer composition which has a gel content in a mentioned range can provide the Plastic solid which was excellent in moldability and was moreover excellent in rubber elasticity, compression set-proof nature, and appearance.

[0042] The components which are carrying out advanced bridge formation thru/o full bridge formation are olefin system rubber (B) and a styrene system block copolymer (C). In a styrene system block copolymer (C), the polymeric block (c-2) portion is participating in the above-mentioned bridge formation.

[0043] The above-mentioned gel content is measured by the following method.

[Measuring method of a gel content] The about 100-mg weighing capacity of the pellet (size: 0.5mmx0.5mmx0.5mm) of a thermoplastic elastomer composition is carried out as a sample, and it is immersed in 30 ml of cyclohexane which is sufficient quantity at 23 *** to this pellet for 48 hours in a well-closed container.

[0044] Next, this sample is taken out on a filter paper, and it dries until it becomes constant weight at a room temperature for 72 hours or more. Let the value which subtracted the weight of all the cyclohexane insoluble elements (a bulking agent, a pigment, a fibrous filler, etc.) other than a polymer component, and the weight of crystalline polio fin resin (A) component in the sample before cyclohexane immersion from the weight of this dry bottom be "the amended last weight (Y)."

[0045] the total weight of the polymeric block (c-2) portion which, on the other hand, constitutes the bridge formation nature component (B), i.e., the olefin system rubber, and styrene system block copolymer (C) of a sample -- {-- that is, [weight / of a sample] (1) cyclohexane soluble components (for example, polymeric block (c-1) portions, such as styrene which constitutes a styrene system block copolymer (C),) other than olefin system rubber (B) The value which reduced the weight of cyclohexane insoluble elements (a bulking agent, a pigment, a fibrous filler, etc.) other than a softener (D), (2) crystalline-polyolefin-resin (A) component, and (3) polymer components} is made into "amended initial

weight (X)."

[0046]A gel content is determined by the following formula from these values.

[the desirable thermoplastic elastomer composition concerning gel content [%] =[(amended last weight (Y))/(amended initial weight (X))] x100 this invention] The mixture which consists of peroxide un-contracting type hydrocarbon system rubber (E) of a bridge crystalline polyolefin resin (A), olefin system rubber (B), a styrene system block copolymer (C), a softener (D), and if needed can be obtained by the ability to heat-treat it dynamically under existence of organic peroxide. [0047]It says ["which is heat-treated dynamically"] kneading by a molten state here. As organic peroxide used by this invention, specifically, Dicumyl peroxide, di-tert-butyl peroxide, 2,5-dimethyl- 2,5 - Di-(tert-butylperoxy)hexane, 2,5-dimethyl- 2,5- The di-(tert-butylperoxy)hexyne- 3, 1,3-bis(tert-butylperoxy isopropyl)benzene, 1,1-bis(tert-butylperoxy)-3, 3, 5 - Trimethylcyclohexane, n-butyl-4,4- Bis (tert-butylperoxy)valerate, Benzoyl peroxide, p-chloro benzoyl peroxide, 2,4-dichlorobenzoyl peroxide, tert-[Butyl cumyl peroxide etc. are mentioned.] tert-[butylperoxy benzoate and] tert-[BUCHIRUPERU benzoate and] tert-[butyl peroxyisopropyl carbonate, diacetylperoxide, lauroyl peroxide, and]

[0048]Among these, it is a point of odor nature and scorching stability, and is the 2,5-dimethyl- 2,5. - Di-(tert-butylperoxy)hexane, 2,5-dimethyl- 2,5- The di-(tert-butylperoxy)hexyne- 3 and 1,3-bis(tert-butylperoxy isopropyl)benzene are preferred, and it is the 2,5-dimethyl- 2,5 especially. - Di-(tert-butylperoxy)hexane is the most preferred.

[0049]In this invention, organic peroxide Crystalline polyolefin resin (A), It is preferably used at a rate of 0.8 - 1.6 weight section 0.6 to 2 weight section to total quantity 100 weight section of olefin system rubber (B), a styrene system block copolymer (C), a softener (D), and the peroxide un-contracting type hydrocarbon system rubber (E) of a bridge.

[0050]In this invention, on the occasion of the partial crosslinking treatment by the above-mentioned organic peroxide, sulfur, P-quinonedioxime, p, p' - Dibenzoyl quinonedioxime, N-methyl- N-4-Dinitroso aniline, nitrosobenzene, diphenylguanidine, The trimethylolpropane N, an assistant for peroxy bridge formation like N'-m-phenylenedimaleimide, Or divinylbenzene, bird allyl cyanurate, ethylene glycol dimethacrylate, Diethylene glycol dimethacrylate, polyethylene glycol dimethacrylate, A polyfunctional vinyl monomer like a polyfunctional methacrylate monomer like trimethylolpropanetrimethacrylate and allyl methacrylate, vinylbutyrate, and vinyl stearate can be blended.

[0051]By using the above compounds, homogeneity and crosslinking reaction [****] are expectable. In particular, in this invention, divinylbenzene is the most preferred. Are easy to deal with divinylbenzene and its compatibility with crystalline polyolefin resin (A) and olefin system rubber (B) which are the principal components of the above-mentioned crosslinking treatment thing is good, And in order to

have the operation which solubilizes organic peroxide and to work as a dispersant of organic peroxide, the bridge formation effect by heat treatment is homogeneous, and the thermoplastic elastomer composition which balance with flowability and physical properties was able to take is obtained.

[0052]As for especially above bridge formation assistants or polyfunctional vinyl monomers, in this invention, it is preferred to use at 0.6 to 2 weight % of a rate 0.4 to 3 weight % to the above-mentioned whole crosslinking treatment thing. If the blending ratio of a bridge formation assistant or a polyfunctional vinyl monomer is in a mentioned range, [the thermoplastic elastomer composition obtained] Since a bridge formation assistant and a polyfunctional vinyl monomer do not remain as an unreacted monomer in an elastomer composition, change of the physical properties by a heat history does not arise in the case of processing shaping, and, moreover, it excels in flowability.

[0053]Although dynamic heat treatment is performed using kneading apparatus, such as a roll mill, an intensive mixer, for example, a Banbury mixer, a kneader, one axis, or a twin screw extruder, it is preferred to carry out in the device of a non-open sand mold. It is preferred to perform dynamic heat treatment under the inert gas atmosphere of nitrogen etc.

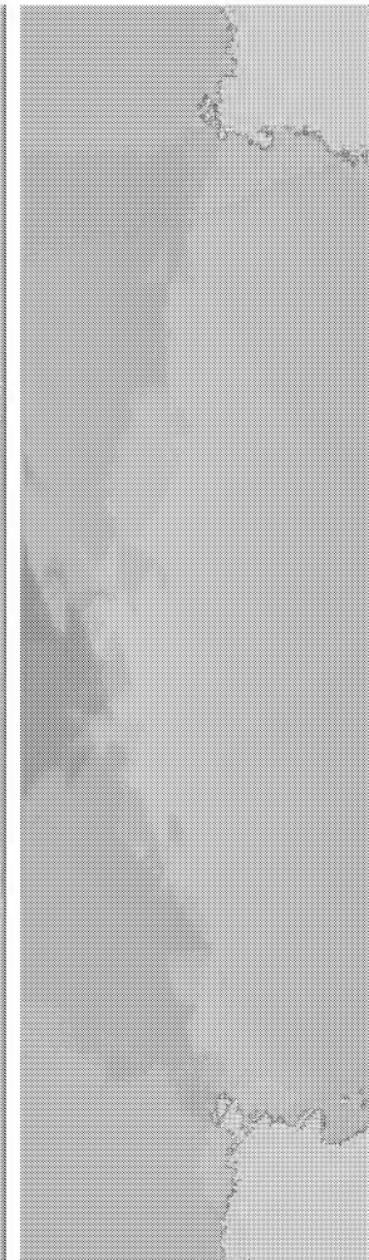
[0054]Temperature of heat treatment is usually performed in the range from the melting point of polyolefin resin to 300 **, and, as for kneading time, 1 to 10 minutes is preferred. The shearing force applied has the desirable range of 500 to 10,000 sec⁻¹ at a shear rate.

[0055]The thermoplastic elastomer composition produced by performing it above can be used if needed, mixing with crystalline olefin resin. As crystalline polyolefin resin used for this mixing, above-mentioned crystalline polyolefin resin (A) is used preferably.

[0056]This crystalline polyolefin resin is preferably used at a rate of five to 100 weight section still more preferably five to 200 weight section to thermoplastic elastomer composition 100 weight section. Moldability can be raised if crystalline polyolefin resin is used at an above rate. And the Plastic solid acquired does not spoil the original plasticity of an elastomer, and rubber elasticity does not fall. Therefore, in this invention, it is preferred to mix and use crystalline polyolefin resin for the thermoplastic elastomer composition produced by performing it above.

[0057]When mixing a thermoplastic elastomer composition and crystalline polyolefin resin, it is desirable to heat-treat dynamically under the absence of organic peroxide by the method mentioned above.

[0058]
[Effect of the Invention][the thermoplastic elastomer composition concerning this invention] [I] Crystalline polyolefin resin (A), [II] olefin system rubber (B), and [III] Styrene or the polymeric block (c-1) of the derivative, The styrene system block copolymer (C) which consists of an isoprene polymer block, a butadiene polymer block, or an isoprene butadiene copolymer block (c-2) and by which hydrogenation was carried out, [IV] Softener (D) Since the [V] peroxide un-constructing type hydrocarbon system rubber (E) of a bridge is contained at a specific



rate and it has a specific gel content if needed further, it excels in moldability and, moreover, the Plastic solid excellent in rubber elasticity, compression set-proof nature, and appearance can be provided.

[0059]Especially the constituent that mixed polyolefin resin, such as the above-mentioned crystalline polyolefin resin (A), at a specific rate to this thermoplastic elastomer composition is excellent in moldability.

[0060]Hereafter, although a work example explains this invention, this invention is not limited to these work examples. The raw material used by the work example and the comparative example is as follows.

O Crystalline polyolefin resin (A)

(A-1) a propylene ethylene block copolymer and a melt flow rate (ASTM D 1238 -- 230 ***) It is [2.16 kg load and] MFR:12g/10 minute, ethylene content:10 mol % (A-2) propylene homopolymer, and MFR:8g/10 minute (A-3) ethylene, 1-butene copolymer, and MFR:25g/10 minute and 1-butene content:7 mol %O olefin system rubber (B) below.

(B-1) Ethylene propylene and the 5-ethylidene- 2 - norbornene copolymer rubber ethylene content: -- 78 mol % and iodine number: -- a 12 and Mooney viscosity [ML₁₊₄(100 ***)]:120O styrene system block

copolymer (C)

(C-1) hydrogenation thing and styrene content: -- amount of hydrogenation: to the whole unsaturated bond of 30 weight % and MFR (10-kg load):0.3g/10 minute and a butadiene polymer block -- a 99.8%O softener (D) [of styrene butadiene styrene block copolymer]

(D-1) Straight-mineral-oil system process oil [Idemitsu Kosan make and PW-380]

O Peroxide un-constructing type hydrocarbon system rubber (E) of a bridge

(E-1) Isobutylene-isoprene rubber and a degree of unsaturation : 0.7 mol % and Mooney viscosity [ML₁₊₈(100 ***)]:45 [0061]

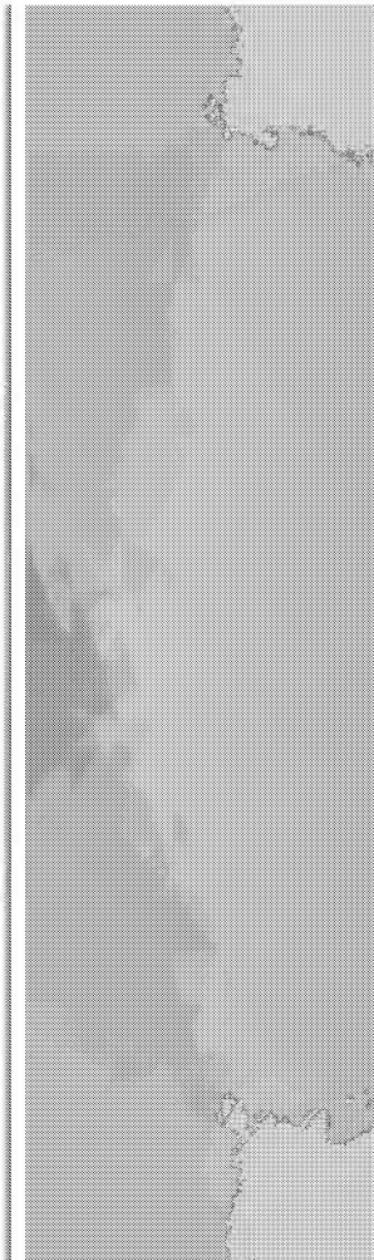
[The work examples 1-4 and the comparative examples 1-5] It blended at a rate which shows the above-mentioned raw material in the 1st table, and after kneading for 5 minutes at 180 ** among a nitrogen atmosphere using a Banbury mixer, the roll was used with the sheet shaped through this kneaded material, it judged with the sheet cutter, and the angle pellet was prepared.

[0062]Subsequently, churning mixing was carried out with the Henschel mixer at this angle pellet, divinylbenzene (following, DVB), and a rate that showed 2,5-dimethyl- 2,5-di-(t-butylperoxy) hexane (following, POX) in the 1st table.

[0063]Subsequently, it extruded and ranked second at temperature of 220 ** under a nitrogen atmosphere using ratio-of-length-to-diameter=40 and a twin screw extruder with a screw diameter of 50 mm, a mixture produced by performing it above was dried for 3 hours in oven kept at 110 **, and a thermoplastic elastomer composition was obtained.

[0064]A gel content of an obtained thermoplastic elastomer composition was calculated by a method mentioned above. The result is shown in the 1st table.

[0065]A compression set was measured as an index of rubber elasticity



by a method (compression temperature: 70 **, pressing time: 22 hours) shown in JIS K 6301. The result is shown in the 1st table.

[0066] In order to evaluate the moldability of a thermoplastic elastomer composition, and appearance of the Plastic solid, Di (GABEDAI) who uses for a 1 axis extruder with a screw diameter of 50 mm by the A method of ASTM D 2230-90 was attached, extrusion was performed on condition of the following, and a Plastic solid was acquired.

[0067] [Extrusion conditions]

preset temperature: -- 220 ** [C1/C2/C3/C4/C5/H/D=160 **/180

**/200 **/220 **/220 **/] /200 ** screw-speed: -- 45-rpm screen mesh:

-- 40-mesh/- as mentioned above [40 meshes] 80 meshes /. A basis indicated to ASTM D 2230-90 estimated appearance (skin, edge) of an acquired Plastic solid. It was presupposed that moldability is evaluated by appearance of a Plastic solid.

[0068] The skin (SURFACE) of a Plastic solid is evaluated in five steps of A-E, A is most excellent in appearance, evaluation is high and evaluation becomes low at the order of B, C, D, and E. Edge (EDGE) of a Plastic solid is evaluated in ten steps of 1-10, 10 is most excellent in appearance, and evaluation becomes low at the order of 9, 8, 7, 6, 5, 4, 3, 2, and 1.

[0069]

[Table 1]

		第3 表 実施例 4				比較例 1				比較例 2				比較例 3				比較例 4				
3	-	1	3	-	2	3	-	1	3	1	3	-	1	3	2	7	-	-	-	-	-	
8	2	7	-	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7	3	1	3	5	2	7	4	8	3	5	4	3	-	-	-	-	-	-	-	-	-	
2	1	2	1	3	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
0	3	0	2	6	3	0	2	6	2	6	2	6	3	0	-	-	-	-	-	-	-	
0	1	0	0	4	0	4	0	4	1	2	1	2	1	2	1	0	1	0	1	0	1	
8	0	8	0	4	0	4	0	4	1	0	1	0	1	0	1	0	0	8	0	8	0	
9	9	9	2	9	6	1	9	5	8	9	9	6	9	9	4	9	9	3	9	9	3	
5	8	7	5	4	8	4	8	4	5	9	5	2	5	2	8	9	8	9	8	9	8	
3	3	7	3	2	5	4	5	4	2	2	2	2	2	2	3	8	3	8	3	8	3	
	A		A		A		A		C		B		B		B		B		B		B	
	9		8		9		4		4		6		6		5		5		5		5	

		実施例 1	実施例 2	実施例 3
原 料	結晶性ポリオレフン樹脂 A-1	1.3	2.0	-
	A-2	-	-	2.3
	A-3	-	-	8
オレフィン系ゴム	B-1	3.5	3.3	2.7
	スチレン系アーテック共重合体 C-1	1.3	1.3	1.2
	軟化剤	D-1	2.6	2.6
重量部	ヘリオキシド ^a 非架橋型 炭化水素系ゴム	E-1	1.3	1.3
	P O X	1.2	1.0	-
	D V B	1.0	0.8	0.8
J I S A 種度	組成物のゲル含量 [%]	9.9	5.9	2.9
	圧縮永久歪 〔%〕	5.5	7.3	8.5
	成形性・成形体の外観 風	2.1	3.1	3.9
エッジ	A	A	A	A
	エッジ	8	1.0	8

[Translation done.]

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